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मानक

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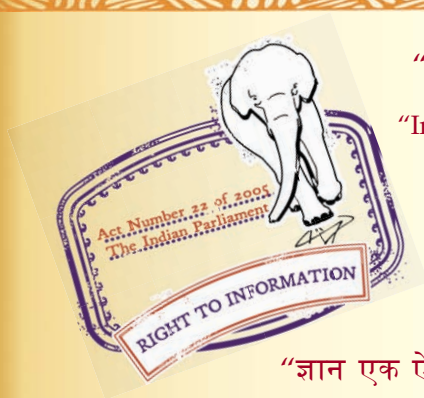
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IS 14693 (1999): 2-Jaw and 3-Jaw Power Operated Wedge Type Chucks [PGD 2: Machine Tool Elements and Holding Devices]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

दो जबड़े और तीन जबड़े वाले पावर
वेजनुमा चक — विशिष्टि

Indian Standard

2-JAW AND 3-JAW POWER OPERATED
WEDGE TYPE CHUCKS — SPECIFICATION

ICS 25.080.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 5

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Machine Tool Elements and Holding Devices Sectional Committee had been approved by the Production Engineering Division Council.

The continuous research in the area of enhancing productivity has given rise to better machine tools and the efforts to reduce fatigue of workmen has led the development of workholding devices operated by power.

The power operated chuck reduces the loading and unloading time and leads to higher productivity, than achieved by manually operated chucks.

This standard is one of a series of Indian Standard available on chucks. The other standards are as given below:

<i>IS No.</i>	<i>Title</i>
2876 : 1978	3-jaw 4-jaw scroll operated self-centering lathe chucks (<i>first revision</i>)
10612 : 1983	4-jaw independent lathe chucks (<i>first revision</i>)
14725 : 1999	2-jaw and 3-jaw hand operated heavy duty cam type self centering chucks— Specification
14694 : 1999	2-jaw and 3-jaw power operated high speed lathe chucks with through bore— Specification
Doc : PE 02 (0185)	Hand operated heavy duty 4-jaw independent chucks — Specification

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

2-JAW AND 3-JAW POWER OPERATED WEDGE TYPE CHUCKS — SPECIFICATION

1 SCOPE

1.1 This standard specifies requirements for power operated self centering wedge type lathe chucks.

1.2 The chucks are of front mounting type that is chucks which are bolted from the front side of the chuck.

2 REFERENCES

2.1 The following standards contain provision which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

IS No.	Title
1570 : 1961	Schedules for wrought steels for general engineering purposes
2063 : 1988	Acceptance code for machine tools—Geometric accuracy of machines operating under no-load or finishing conditions (<i>first revision</i>)

IS No.

Title

2102 (Part 1) :
1993

General tolerances : Part 1
Tolerances for linear and angular
dimensions without individual
tolerance indications (*third revision*)

2876 : 1978

3-jaw and 4-jaw scroll operated
self-centering lathe chucks (*first
revision*)

3 TERMINOLOGY

For the purpose of this standard, the terminology as given below shall apply (*see also* Fig. 1).

3.1 Chuck

Device to be mounted on the spindle nose of a machine tool for holding a work piece or a tool (directly or with an adapter).

3.2 Power Operated Self Centering Chucks

A chuck in which all the jaws move simultaneously towards or away from the axis of rotation.

This chuck is operated by hydraulic or pneumatic or electrical power actuator linked to chuck operating mechanism to move the jaws simultaneously inward or outward, radially to grip the work piece, concentric to the axis of rotation.

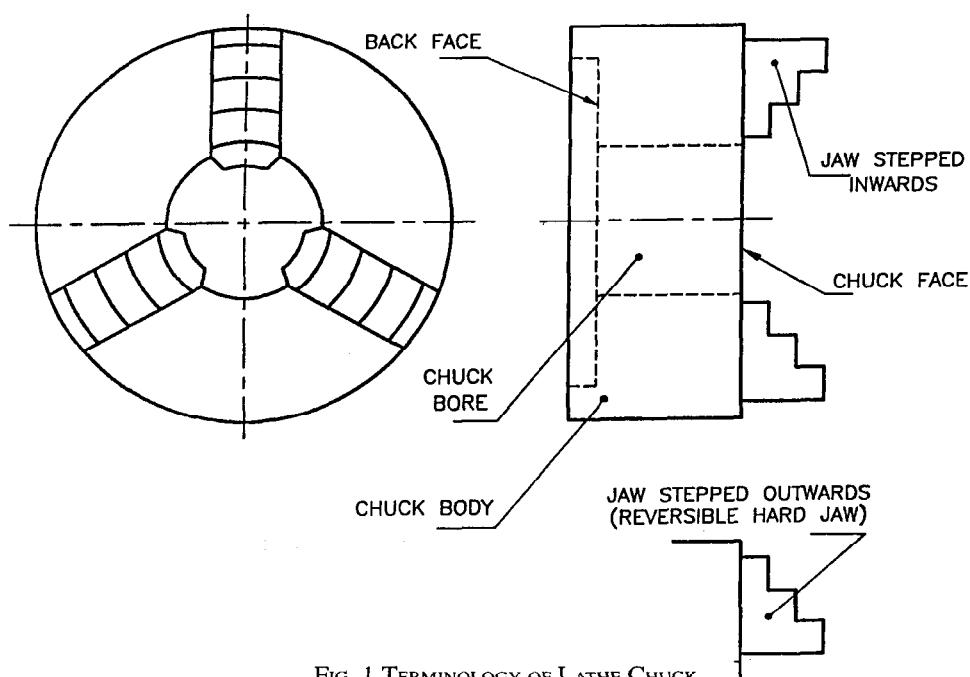


FIG. 1 TERMINOLOGY OF LATHE CHUCK

3.3 Chuck Body

The part of the chuck which encloses operating mechanisms, and jaws, and also provides for mounting.

3.3.1 Chuck Face

The face from which the master jaws protrude.

3.3.2 Back Face

The face of chuck that contacts the face of the spindle or adaptor when chuck is mounted on the machine.

3.4 Master Jaw (Base Jaw)

The part formed to fit in the jaw slot of the chuck body and provides for mounting top jaw either hard or soft. Master jaws once fitted in a body shall not be interchanged.

3.5 Top Jaw

3.5.1 The work holding member, intended to be mounted and clamped on the master jaw.

3.5.2 The top jaw may be either hard or soft.

3.5.2.1 Hard jaws have to be ground in position. Once so ground, the jaws shall not be interchanged. These jaws are reversible.

3.5.2.2 Soft jaws have to be machined in position. Once removed, these jaws have to be remachined after refitment.

3.6 Jaw Actuator

This member of the chuck is connected to power source and moves the base jaw through chuck operating mechanism.

4 MATERIAL

4.1 Body

Medium carbon steel having minimum hardness of 190 HB to 220 HB. Jaw guide ways shall be hardened to 46 HRC to 52 HRC.

4.2 Master Jaw (Base Jaw)

Suitable steel case hardened to a hardness of 54 HRC to 60 HRC.

4.3 Jaw Actuator (Wedge)

Suitable steel case hardened to a hardness of 54 HRC to 60 HRC.

5 DIMENSIONS

5.1 The dimensions for chucks shall be as given in Table 1.

5.2 The capacity of lathe chuck shall be as given in Table 2.

6 DESIGNATION

6.1 A power operated 2-jaw and 3-jaw wedge type chuck shall be designated by name, number of jaws, nominal diameter and number of this standard.

Example

A power operated wedge type 2-jaw chuck of nominal dia 200 shall be designated as:

Power Operated Chuck IS 14693-2-200

7 MOUNTING INSTRUCTIONS

7.1 The lathe chucks shall be mounted on the lathe spindle as shown in Fig. 2.

8 TESTING

8.1 Geometrical Test

8.1.1 Preliminary Remarks

Since all the geometrical tests to be carried out involve the chuck rotation, the chuck should be mounted on the suitable test spindle. The mounting of the chuck on the spindle nose shall be made either directly on the spindle nose or with an adapter placed between the spindle nose and the chuck. The flange or the adaptor shall have been already tested for the accuracy of size, concentricity with the spindle axis and absence of face out of the flange or adaptor.

8.1.2 Spindle Accuracy

The spindle accuracy shall be tested according to IS 2063 and 8.2.11 of IS 2876.

8.2 Concentricity of Outside Diameter

When a chuck is mounted on spindle as shown in Fig. 2, the concentricity of the outside diameter shown by a dial indicator reading shall be within the limits as given in Table 3.

8.3 Accuracy of Grip on Test Bar

The accuracy required shall be as given in Table 4.

8.3.1 This test shall be carried out with, mandrels of three different diameters as given in Table 4 for each size of chuck. The mandrel shall be clamped by jaws stepped outwards and the dial gauge shall be engaged on the mandrel at a distance 'l' from the jaw. The dial gauge reading shall not exceed the maximum values given in Table 4.

8.3.2 The accuracy of test bar to be used shall conform to the requirements given in A-1 of IS 2063.

8.4 Accuracy of Grip on Test Ring

8.4.1 External Jaws

The accuracy of grip of external jaws on test ring shall be as given in Table 5.

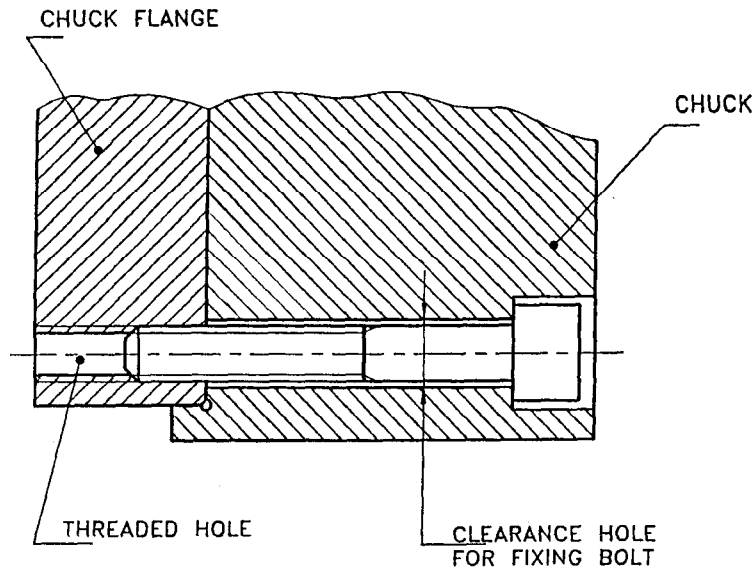


FIG. 2 MOUNTING OF CHUCK

8.4.2 Internal Jaws

The accuracy of grip of internal jaws on test ring shall be as given in Table 6.

8.5 Static Balancing

The static balance of the chuck shall be tested in the following manner.

8.5.1 The chuck shall be mounted on mandrel. The mandrel shall incorporate an adapter integral with it and accurately finished to fit the location of the chuck to be tested.

The mandrel with the adaptor shall have been already balanced prior to the chuck being mounted on it. The

location of the cap screws, bolts or studs for holding the chuck on the adaptor shall be in balance. The chuck shall then be mounted on the adaptor and the mandrel placed on knife-edges as shown in Fig. 3. The weight required to effect the static balance for the self centering chuck shall conform to the limits specified in Table 7 and the arrangement is given in Fig. 3. The test shall be carried out only when the chuck is completely dry inside and without top jaws, T-nuts/ Hexagon socket cap screws.

9 RIGIDITY

The rigidity of a chuck shall be expressed in terms of its ability to reproduce its accuracy of grip on a test

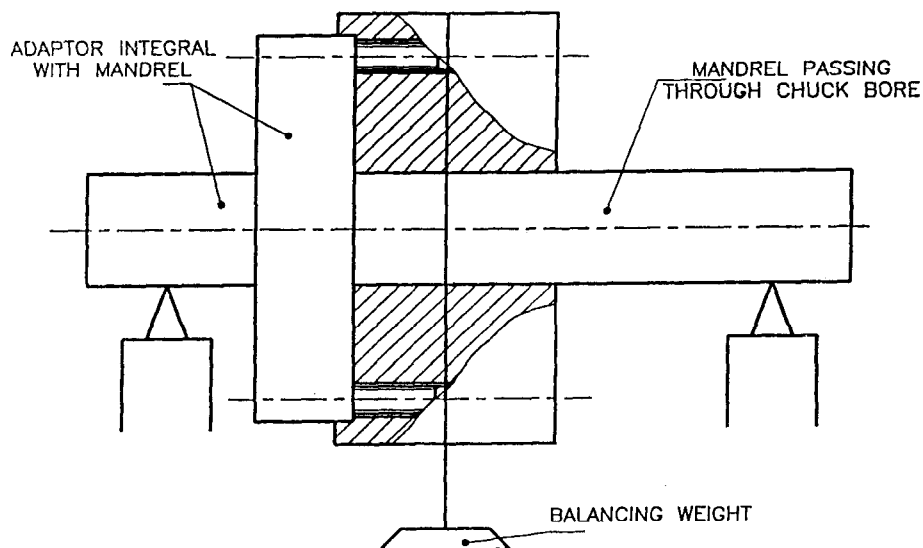


FIG. 3 TEST ARRANGEMENT FOR STATIC BALANCE

bar after having been subjected to the gripping and cutting tests.

9.1 The test shall be carried out as detailed below:

- a) The chucks shall be mounted on a lathe of adequate power and rigidity and a test bar shall be gripped in the jaws. The cutting test shall then be carried out at the feeds and depth of cut as specified in Table 8.
- b) The test bar shall be made of steel conforming to grade C14 of IS 1570. Suitably heat treated to hardness of 20 HRC.
- c) The diameter of the test bar shall be equal to the maximum capacity of the chuck for bar work as specified by the manufacturer.
- d) The length of the test bar hanging out beyond the chuck jaw for this shall be twice the diameter of the bar.
- e) During the turning test the bar shall not be supported by any centre or steady rest.
- f) After completion of the test as specified in Table 8 the chuck shall be capable of retaining its original accuracy of grip as specified in 8.3 and 8.4.

9.1.1 The rigidity test is not a routine test, and shall be carried out as agreed between the purchaser and the manufacturer.

10 PRESERVATION AND PACKING

10.1 The chucks shall be given suitable anti-corrosive surface treatment

10.2 The chuck shall be packed in accordance with best trade practice.

11 MARKING

11.1 The chucks shall be marked at an appropriate place with manufacturer's name or trade-mark, size, maximum speed and maximum actuating force.

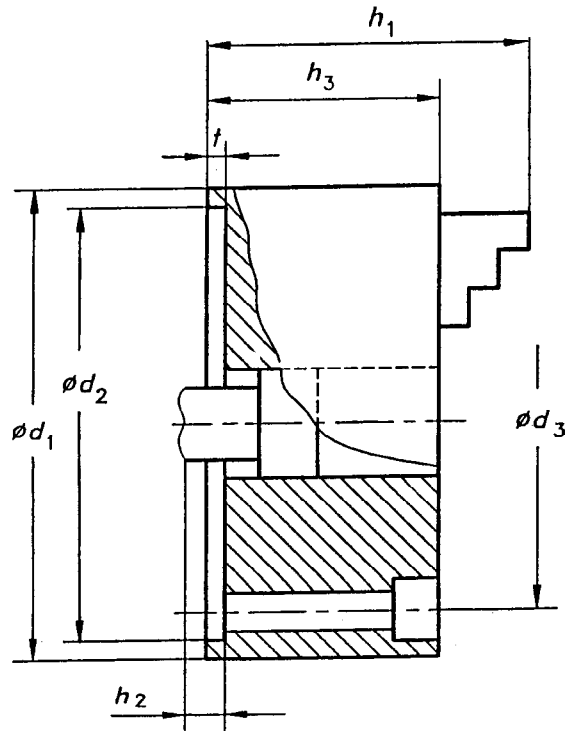
11.2 BIS Certification Marking

11.2.1 The product may also be marked with Standard Mark.

11.2.2 The use of the Standard Mark is governed by the provision of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 1 Dimensions for Lathe Chucks
(Clause 5.1)

All dimensions in millimetres.



Sl No. (1)	Nominal Size, d_1 (2)	d_2 H ₆ (3)	PCD d_3 (4)	Tol (5)	Actuator Stroke, h_2 (6)	t (7)	h_1 (8)	Max Speed rpm (9)	Max Draw Bar Pull, kN kgf (10)	h_3 (11)	Jaw Stroke (12)
i)	110	92	80	± 0.1	8.5	3	76	4 000	6.9 (700)	31.5	2.1
ii)	125	115	92	± 0.15	19	6	104.5	3 200	8.5 (860)	61	4.2
iii)	160	150	125	± 0.25	19	6	132	2 800	12.6 (1280)	81	4.2
iv)	200	185	160	± 0.3	22	6	154.5	2 300	20.9 (2130)	93	5.4
v)	250	185	160	± 0.35	22	6	163.5	2 000	36.1 (3680)	93	5.4
vi)	315	300	250	± 0.4	22	6	174	1 700	52.8 (5380)	98	5.4
vii)	400	300	250	± 0.4	30	6	212	1 400	85.5 (8720)	127	8
viii)	500	460	300	± 0.4	30	6	225	900	85.5 (8720)	127	8

NOTE — Dimensional deviations for untoleranced dimensions shall be of medium class according to IS 2102 (Part 1).

Table 2 Capacities of Lathe Chucks
(Clause 5.2)

All dimensions in millimetres.

MINIMUM EXTERNAL
CLAMPING

MINIMUM INTERNAL
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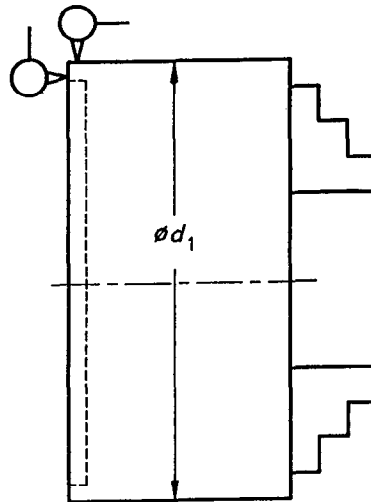
MAXIMUM EXTERNAL
CLAMPING

MAXIMUM INTERNAL
CLAMPING

Sl No.	Nominal of Chuck ϕd_1	External Clamping			Internal Clamping	
		ϕd_6 Min		ϕd_7 Max	ϕd_8 Min	ϕd_9 Max
(1)	(2)	(3)	(4)	(5)	(6)	
i)	110	4		110	22	110
ii)	125	10		125	34	125
iii)	160	18		160	39	160
iv)	200	20		200	56	200
v)	250	24		250	60	250
vi)	315	50		315	72	315
vii)	400	95		400	102	400
viii)	500	108		500	102	500

Table 3 Concentricity of Outside Diameter
(Clause 8.2)

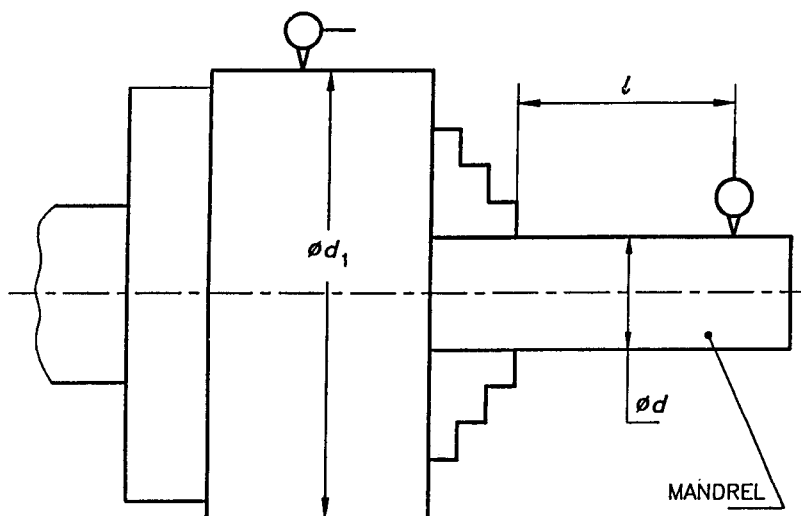
All dimensions in millimetres.



Sl No.	Nominal Dia of Chuck ϕd_1		Permissible Deviation (TIR)	
	From	Up to and Including	Radial	Axial
(1)	(2)	(3)	(4)	(5)
i)	110	160	0.02	0.02
ii)	200	250	0.04	0.02
iii)	315	400	0.05	0.03
iv)	500	—	0.06	0.04

Table 4 Accuracy of Grip on Test Bar
(Clause 8.3.1)

All dimensions in millimetres.

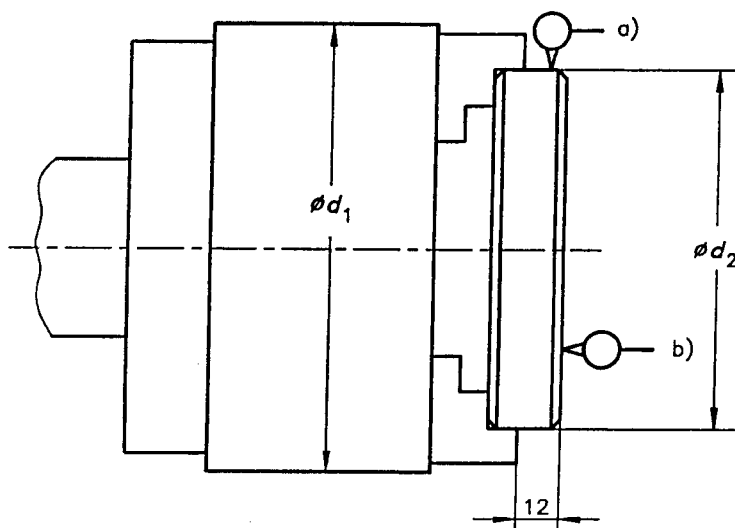


Sl No.	Nominal Size of Chuck ϕd_1	Diameter of Mandrel ϕd			l	Permissible Deviation (TIR)
		(3)	(4)	(5)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	110, 160	20	32	50	60	0.05
ii)	200, 250	32	50	80	80	0.06
iii)	315, 400	50	80	125	120	0.08
iv)	500	80	125	200	150	0.1

Table 5 Accuracy of Grip of External Jaws

(Clause 8.4.1)

All dimensions in millimetres.

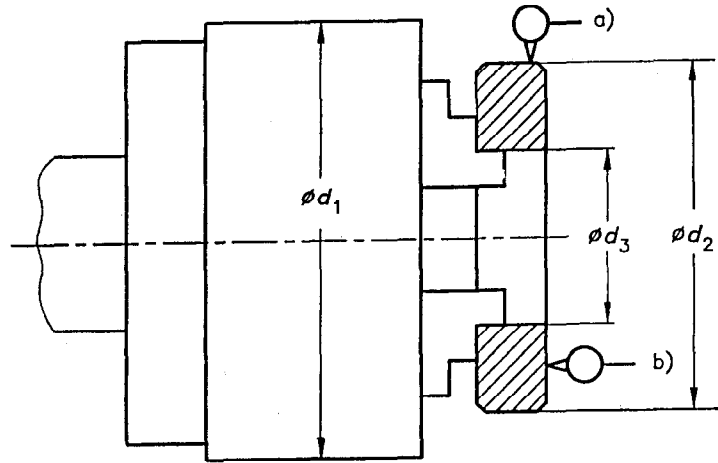


Test	Nominal Dia of Chuck, ϕd_1 Over	Up to	ϕd_2	Permissible Deviation (TIR)
(1)	(2)	(3)	(4)	(5)
Reading on periphery a)	110	160	100	0.04
	200	250	160	0.06
	315	400	250	0.08
	500	—	400	0.1
Reading on face (as near to periphery as practicable) b)	110	160	100	0.03
	200	250	160	0.03
	315	400	250	0.04
	500	—	400	0.04

NOTE—Each jaw step shall be tested. A single test ring should be used for each step. The external diameter of the test ring shall be smaller than the diameter at which the jaws have been ground.

Table 6 Accuracy of Grip on Internal Jaws
(Clause 8.4.2)

All dimensions in millimetres.



Test (1)	Nominal Dia of Chuck ϕd_1		ϕd_2 (4)	ϕd_3 (5)	Permissible Deviation (TIR) (6)
	From (2)	Up to (3)			
Reading on periphery a)	110	160	100	50	0.04
	200	250	160	80	0.06
	315	400	250	125	0.08
	500	—	400	200	0.1
Reading on face (as near to periphery as practicable) b)	110	160	100	50	0.03
	200	250	160	80	0.03
	315	400	250	125	0.04
	500	—	400	200	0.04

NOTE—Each jaw step shall be tested. A single test ring should be used for each step. The internal diameter of the test ring shall be bigger than the diameter at which the steps of the jaws have been ground.

Table 7 Permissible Residual Dynamic Imbalance
(Clause 8.5.1)

All dimensions in millimetres.

SI No. (1)	Nominal Size of Chuck mm (2)	Permissible Imbalance	
		gmm (3)	g (4)
i)	110	34	0.6
ii)	125	90	1.4
iii)	160	160	2
iv)	200	405	4.1
v)	250	725	5.8
vi)	315	1 800	11.4
vii)	400	3 590	17.9
viii)	500	7 000	28

NOTE—Permissible imbalance in gmm is calculated as:
Permissible weight (g) x Radius of chuck (mm)

**Table 8 Values of Feed, Depth of Cuts for
Cutting Test**
[Clause 9.1(a)]

All dimensions in millimetres.

SI No. (1)	Nominal Dia of Chuck d_1 (2)	Feed mm/rev (3)	Depth of Cut (4)	Cutting Speed m/min (5)
i)	110	0.25	3.0	100
ii)	125	0.25	3.0	100
iii)	160	0.30	4.0	100
iv)	200	0.30	4.0	100
v)	250	0.40	6.0	100
vi)	315	0.40	6.0	100
vii)	400	0.50	8.0	100
viii)	500	0.50	8.0	100

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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